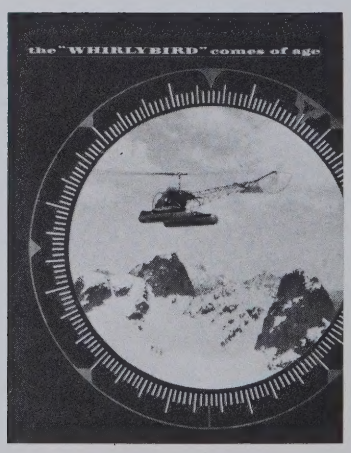
the "WHIRLYBIRD" comes of age

The Vancouver Lions form an appropriate backdrop for a helicopter of the Okanagan Group. This rugged country is, in fact, the "Whirlybird's" natural habitat, for it came of age with mountain flying and later proved its value in all types of difficult terrain.

the cover

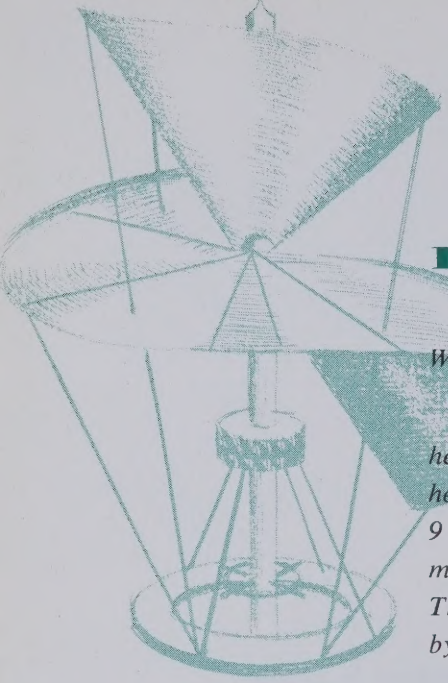


"This peculiar form of transportation is exciting; it exists; it is expanding." Startled, and with typical restraint, so commented the Wall Street Journal upon the development of the helicopter.

And to the accelerated and widespread usage of helicopters no country has made such an important contribution as Canada.

Here, keeping pace with our expanding economy, the helicopter has made possible the opening of new frontiers, and has proved that the barriers of Nature need no longer slow the progress of Man.

Truly, it is an exciting story. But the purpose of this booklet is to show the practicality of helicopters in a variety of applications . . . and to prove by the success story of the Okanagan Group the unlimited horizons for their users.



Da Vinci Aerial Screw.

how it began

"The helicopter is so new that it was not until the first year of World War Two that the first one was flown successfully in the Western Hemisphere.

*Remarkable it is, then, that less than ten years after the war, the helicopter manufacturing industry had progressed to where 11 different helicopter models were in production, 14 were in the prototype stage, and 9 were in the design stage. Fifteen thousand people were employed in their manufacture, and sales were averaging better than $150 million a year. The manufacturers' backlog of helicopter orders had reached $550 million by the end of 1954."**

In the early 1500's Leonardo da Vinci drew pictures and built models of machines with whirling blades. Like many of Leonardo's ideas, the helicopter remained "on ice" until the twentieth century, when Germany took the lead in its development.

In 1937 the Focke-Achgelis succeeded in staying in the air for one hour and twenty minutes.

A year later Igor Sikorsky outdid this by remaining airborne for an hour and thirty-two minutes. In the following years several firms started building helicopters for sale to the military, and early in 1946 Bell Aircraft received the first certification of a helicopter for commercial use.

The industry was pushing ahead, and its record in the Korean war caused it to expand at such a fantastic rate that today, within a decade of its first commercial certification, this new method of flight has cracked many of Nature's barriers and performed feats hitherto considered impossible.

The first purchases of commercial helicopters in 1947 and 1948 were, for the most part, for the purposes of spraying and dusting, but the versatility of this new machine soon found new fields until today helicopters are accepted as *the* mode of transportation in rough and mountainous terrain.

This field covers a multitude of applications and offers by far the greatest possibilities for today's helicopter operations.

And when scheduled passenger runs are considered to be economically practical, the Okanagan Group will be prepared to develop this phase of its operations beyond its present experimental stage.

* From an address by Raymond Sawyer, Executive Director of the Civil Aeronautics Board.

Pioneers all, Igor Sikorsky (at the controls of one of his S55's) with Carl Agar and Douglas Dewar during Sikorsky's visit to the Okanagan Group's headquarters in Vancouver.

a Canadian venture

1947 : 1 Helicopter—3 Men—31.40 Hours Flown.

NOW (1956): 31 Helicopters—105 People representing 1,145 years of aviation experience. Hours flown: 40,000.

The largest commercial helicopter operation in the World!

HOW DID IT HAPPEN? Imagination, farsightedness, conviction in an idea . . . Call it any of these, but add more than a grain of courage, and sprinkle it liberally with hard-earned experience, and you have the answer.

CARL AGAR, an Ontario farm boy, came out of the RCAF after the Second World War with little more than a distinguished career, an Air Force Cross and a pilot's licence.

Starting a flying school in Penticton, in the apple-growing Okanagan Valley of British Columbia, he quickly saw the possibilities of fruit spraying. Although he had never flown a helicopter (few people had in 1946) it occurred to him that this might be the ideal vehicle.

He went down to the Wenatchee Valley in Washington to see how these weird birds were flown. Full of enthusiasm, he returned to the Okanagan determined to buy a helicopter. All he needed was the cash . . .

At this point Lady Luck smiled on Agar, and a retired financier named Douglas Dewar and O. St. P. Aitkens, President of Okanagan Investments Ltd., were instrumental in raising the necessary capital. This backing made the start possible, and their unfailing interest and unstinted support has carried the company to its present position.

Alf Stringer, an old friend of Agar's from Air Force days, was in the business from its inception, in charge of maintenance, and his energy in this direction fully matched Carl's on the flying side.

Glenn McPherson, a pilot and a lawyer with a decade in financial and government circles, joined the company as Vice-President and Secretary-Treasurer. His entry supplied the strength of management required to supplement the operational team of Agar and Stringer.

Pilot, engineer, businessman and financier . . . this was the team which, in the face of widespread scepticism, set out to introduce a revolutionary method of flight transportation to Canada.

The "assets" at the end of 1947? One helicopter and an overdraft of $13,644 Small beginnings . . .

More than a match for the forbidding peaks of British Columbia's mountain ranges, Okanagan pilots carry men and materials into otherwise inaccessible locations.

The international recognition which has been given to the Okanagan Group for its leadership in the operation of rotary-wing aircraft reflects to a large extent upon Carl Agar and his team of pilots and engineers.

Apart from the coveted McKee Trophy of Canada, Agar has been awarded the Captain W. J. Kossler Award for his "contribution in the practical application and operation of rotary-wing aircraft". Agar is the first person outside the United States to receive this recognition.

Recently Agar was elected President of the Helicopter Association of America, yet another first for Canada.

It is certain that Carl Agar has been responsible for the training of more helicopter mountain pilots than any other man alive, for the Group has carried out advanced and specialized training of pilots for the United States Army Transport Command, the French Air Force and the Indonesian Air Force. Pilots have also been trained for the Royal Canadian Air Force and Industry.

Agar is one of the acknowledged world authorities on helicopters and, through an associated company, Agar Helicopter Consultants Ltd., one of his many projects has been to act as advisor to the Government of Dutch New Guinea and K.L.M., on helicopter operations.

A busy man, Carl Agar, but not too busy to ensure that the Okanagan Group and Canada retains the lead with this amazing new vehicle . . .

the record to date

Since 1947, tasks previously considered impossible, or at least so costly as to be impractical, have become routine to the Okanagan Group.

It was Agar who surveyed the virtually impassable mountain route for the Alcan transmission lines. A team of pilots and engineers then made it possible to erect towers by landing steel and other construction materials on postage stamp platforms in otherwise inaccessible areas.

With growing realization that there IS a way to do the impossible, so grows the list of Okanagan achievements.

The Group assisted in building part of the Trans Mountain Oil Pipe Line between Edmonton and Vancouver and has contracted to patrol the entire line every ten days.

Timber cruisers, topographical and geological survey men have been carried to all parts of Canada and, more recently, have flown for approximately four months within a few hundred miles of the North Pole.

T & H Engineering, an aggressive group of forestry consultants, undertook a survey of the Kitimat forest resources and completed in one season what would have taken four seasons under ordinary circumstances. Furthermore, the cost was fractional for the 500 hours flying time.

In the Prairie Provinces, they have carried out geological surveys including the use of an airborne scintillometer. In Quebec, they have been engaged in prospecting and railroad construction. In Newfoundland, the Group's helicopters are providing transportation for technical personnel and are extensively used as flying ambulances.

In Ontario, they have proved that the helicopter is suitable for aeromagnetic survey using a magnetometer. Throughout Canada, fire and pest control is an evergrowing responsibility, and reseeding of logged off areas poses still another challenge.

The Okanagan Group has assisted in the construction of one of Canada's major defence lines.

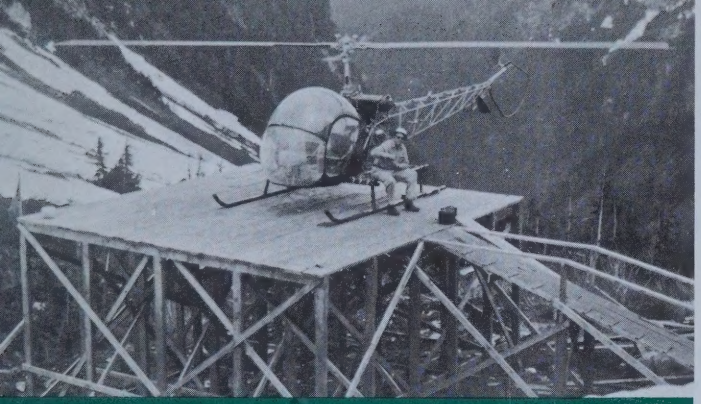
In the meantime, how has the original company—Okanagan Air Services Ltd.—developed into this widespread group?

When the Company climbed out of the red in 1950, the directors decided that expansion, despite the still enormous risk of failure, was the thing to do. Accordingly, more and more helicopters . . . Bells and Sikorskys . . . were purchased.

In 1954, the Company expanded to Newfoundland under the name of United Helicopters Limited with a base at St. Johns.

Two existing companies were bought outright in 1955. These are Canadian Helicopters (1954) Limited of Toronto, together with bases at Toronto Island Airport, Fort William and Gander, Newfoundland; and Smart Aviation Limited of Toronto.

From two men, one helicopter and an overdraft of $13,644 to a Continent-wide group with over 100 employees, 31 helicopters and an annual income exceeding a million and a half dollars in less than ten years would be accepted as quite a record in most operations. In a venture as completely new and untried as helicopters it must be phenomenal . . .

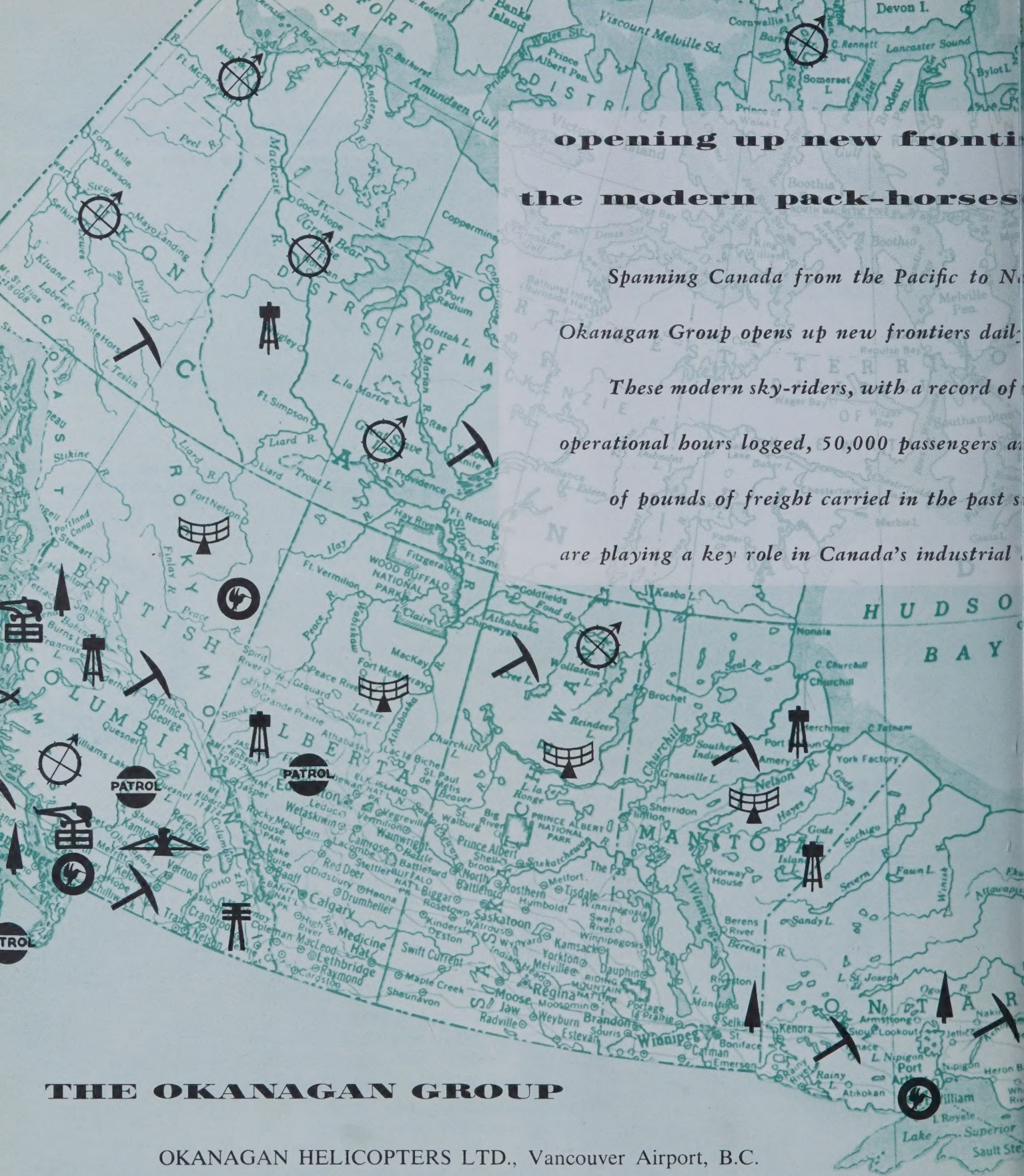


Platform pilots at Kemano flew in steel and other construction materials by helicopter to facilitate the building of transmission line towers.

If it's too big, just sling it underneath . . . A Sikorsky carries a girder for the Kitimat-Kemano transmission line to the erection point in the mountains.

Pontoons, suitable for landings on water, snow or rough ground, are fitted to this Bell 47 of the Okanagan Group.

In go the supplies by the modern packhorse—an Okanagan Group Sikorsky S55.



THE OKANAGAN GROUP

OKANAGAN HELICOPTERS LTD., Vancouver Airport, B.C.
CANADIAN HELICOPTERS (1954) LIMITED, Toronto Island Airport, Toronto, Ontario.
UNITED HELICOPTERS LIMITED, Torbay Airport, St. John's, Newfoundland.
SMART AVIATION LIMITED, Toronto Island Airport, Toronto, Ontario.
AGAR HELICOPTER CONSULTANTS LTD., Vancouver Airport, B.C.

f the air

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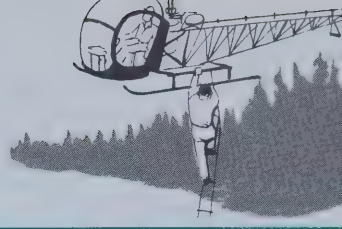
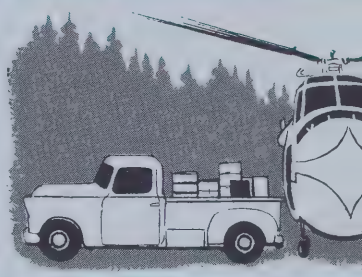
LEGEND

- *OKANAGAN GROUP BASES*
- *FISHERIES*
- *POWER LINES*
- *TRAINING*
- *DEFENSE*
- *FORESTRY*
- *PROSPECTING*
- *CONSTRUCTION*
- *EXPLORATION*
- *MEDICAL RELIEF*
- *PATROLS*
- *SURVEYS*



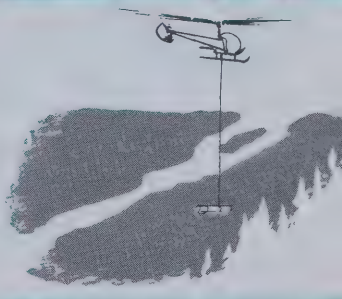
EXPLORATION



DEFENSE

PATROL

PERSONNEL CARRYING



GEOLOGICAL SURVEY

FREIGHT CARRYING

Helicopter's eye view of forest and mountains.

Kitimat forest survey project

"As in most jobs, TIME and COSTS are the most important factors," say T & H Engineering Limited.

"By using helicopters on the Kitimat Forest Survey Project, we calculated a saving of over $40,000 alone in direct costs of moving men and equipment, which in itself offset the charter and flying time.

"The most important factor of all, we estimate to have cut down the field work from 4 seasons to 1, giving the same work coverage and intensity of sampling with the same number of men.

"Men who are making financial decisions involving millions of dollars for investment in development processes of this nature are sure to benefit one way or another by the experience with which the work is carried out.

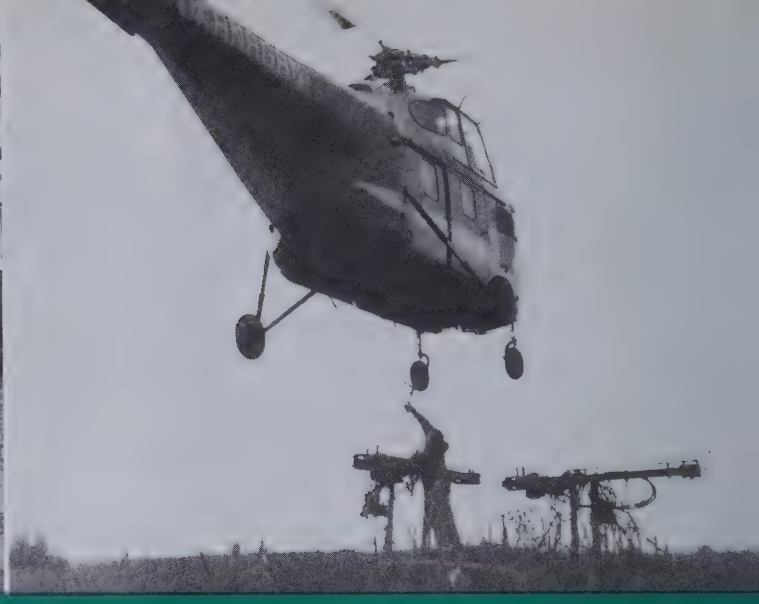
"Okanagan Helicopters gave excellent performance . . ."

Daily, the Okanagan Group is proving to Canadian business and industry the advantages of helicopter usage. Forest surveys are but one of many applications.

helicopters in Newfoundland

In its programme to facilitate the work of its officials in Newfoundland, the Federal Fisheries Department has found the helicopter of great value. Key technical personnel are transported by the Group's helicopters to various locations on the Island for inspection purposes and to supervise the construction of new processing plants. The Provincial Department of Health has chartered a helicopter to act as an air ambulance providing prompt medical service for the people living in the little coves scattered around the 900 miles of coastline.

When ice floes stop surface transportation between Belle Isle and the mainland, helicopters have been used to lift passengers and freight across the Strait.



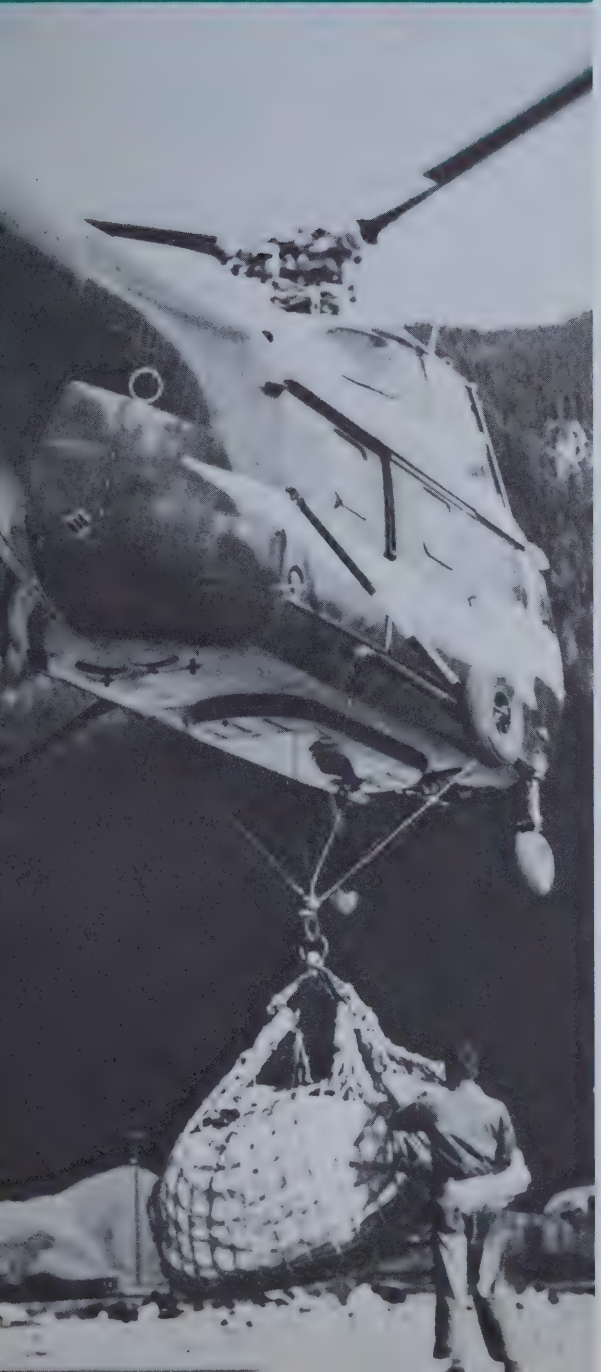
exploration

In 1955, the Okanagan Group assisted the Canadian Government in its development programme of the fifteen islands, lying in the Arctic Ocean to the north of the Canadian mainland. The "Franklin" Operation was by nature a geological survey. Work commenced out of Resolute Bay on Cornwallis Island, the most Southerly of five bases and situated 300 miles North of the Magnetic Pole, and was carried on during the period June to September. An air survey of 7,500 miles was conducted. All supplies, including dog teams, were ferried by the helicopters, and the operation was considered a great success. It is difficult to estimate how long this job would have taken without the use of helicopters.

mining

The mining world soon realized the possibilities of the helicopter. Experienced mountain helicopter pilots are able to transport prospectors and their equipment into inaccessible regions in a very short time, and bring them out when their work is finished. Whole areas may be covered systematically, and usually the small landing area necessary permits landings directly at the points desired.

The Group's helicopters, flying at 100 feet, have successfully prospected for uranium with a scintillometer, landing wherever samples were required.



patrol

Just one type of patrol being carried on by helicopters of the Okanagan Group is that of the Trans Mountain Oil Pipe Line running from Edmonton to Vancouver, a distance of 712 miles. A complete patrol of the line is done every ten days. The ability of the helicopter to fly low and slow over the line, and to land beside it if necessary, permits the observer to notice any breaks, leaks or other trouble. Here is the record to the end of the second year of operation—

TOTAL NUMBER OF PATROLS	355
TOTAL HOURS FLOWN	1,234:55
DAYS FLOWN	380
TAKEOFFS AND LANDINGS	1,415
MILES PIPELINE PATROLLED	80,511

transportation

Apart from personnel, the helicopters have transported the following stores and equipment into otherwise inaccessible points—

Beds, blankets, stoves and heaters. Baggage and personal effects. Engines and cement mixers. Donkey engines, high lines and compressors. Sand, gravel and cement. Reinforcing steel. Plywood and alloy sheeting. Pumps and rock drills. Rope, hose and cable. Cookhouse equipment and refrigerators. Power saws, electrical and radio equipment. Tools, chains, chokers and wheelbarrows. Dynamite, caps, gasoline and fuel oil. Windows, doors, tents and tarpaulins. Groceries, meat, fresh milk and medical supplies. Pipe, tracking, metal and aluminum extrusions. Castings, insulators and tinware. Prefabricated houses, shingles and roofing.

And so on *ad infinitum* . . .

the "bird" operation

The group has a long term contract with an eastern Canadian company which has developed a new electromagnetic device to determine the mineral content of survey areas.

Owing to the low altitude and slow speed of the helicopter, this equipment is considerably more effective than if carried in conventional aircraft. The Okanagan Group helicopter with its EM-unit can survey small areas which are uneconomical to do with the larger aircraft. It can also survey precipitous areas.

Shown is the Okanagan Group helicopter carrying pilot and EM-operator about to lift the device's 20-foot-long "bird" which when towed over the ground picks up information about its mineral content.

it's all a question of time and money

The questions which will naturally occur to every businessman where helicopters are concerned are: What will it *cost* to use helicopters on *my* project? Can they do the job? Is it economically feasible to use them?

Frankly, we do not know, *generally,* where helicopters can be used economically. *Specifically,* it is possible to weigh up the work involved and to assess the possible cost. To anyone concerned with an operation in difficult territory, we suggest that it would be worthwhile investigating the possibility of helicopter usage, and point to the amazing record to date.

For instance, on the Alcan project, it has been stated that without the use of helicopters to survey the transmission line routes, and to ferry in materials for construction, "this entire project might have taken up to two years longer." It would be impossible to place a dollar value on the extra cost had not helicopters been used, but certainly the figure would have been many millions.

On the Kitimat Forest Survey, it is estimated that over three seasons field work was saved; again the savings in dollars could not actually be assessed.

The simple yardstick would appear to be that if the terrain to be covered cannot be done quickly and effectively by land transportation or fixed-wing aircraft, then the time has come to investigate the use of helicopters.

If you have a transportation problem, the Okanagan Group will be pleased to make available technical advice.

Okanagan Helicopters Ltd.

DIRECTORS:

Carl C. Agar, A.F.C., Vancouver, B.C.
O. St. P. Aitkens, M.C., Kelowna, B.C.
D. W. Ambridge, C.B.E., Toronto, Ont.
A. H. Bent, Penticton, B.C.
D. Dewar, C.B.E., Vancouver, B.C.
W. J. MacKenzie, M.E., Kelowna, B.C.
G. W. McPherson, Vancouver, B.C.
A.V.M. L. F. Stevenson, C.B., Vancouver, B.C.
A. Stringer, Vancouver, B.C.
J. J. West, Vancouver, B.C.

OFFICERS:

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Vice-Chairman	O. St. P. Aitkens, M.C., Kelowna, B.C.
President and Managing Director	G. W. McPherson, Vancouver, B.C.
Vice-President of Research and Training	C. C. Agar, A.F.C., Vancouver, B.C.
Vice-President of Operations	A. Stringer, Vancouver, B.C.
Vice-President of Development	J. C. Charleson, Ottawa, Ont.
Secretary-Treasurer	H. C. Greene, C.A., Vancouver, B.C.

Chief Pilot and Base Manager:
F. W. Snell

Operations Manager:
J. L. Lannon

Chief Engineer:
R. G. Askin

Bases:
Vancouver, Kemano, Fort St. John, B.C.

Head Office:
Vancouver Airport, B.C.

Canadian Helicopters (~~1951~~) Limited

Toronto Island Airport, Toronto, Ontario.

DIRECTORS:

C. C. Agar, A.F.C., Vancouver, B.C.
J. C. Charleson, Ottawa, Ont.
Clark B. Davis, Toronto, Ont.
H. Donald Langdon, Q.C., Toronto, Ont.
G. W. McPherson, Vancouver, B.C.
A. Stringer, Vancouver, B.C.
J. J. West, Vancouver, B.C.

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President	G. W. McPherson, Vancouver, B.C.
Managing Director	J. C. Charleson, Ottawa, Ont.
Vice-President of Research and Training	C. C. Agar, A.F.C., Vancouver, B.C.
Vice-President of Operations	A. Stringer, Vancouver, B.C.
Secretary-Treasurer	H. Donald Langdon, Q.C., Toronto, Ont.

Base Manager and Operations Manager:
S. W. Hubenig

Chief Pilot.
T. R. Gurr ~~H. K. Iverson~~

Chief Engineer:
W. Finlay

Bases:
Toronto Island Airport, Toronto, Ont.
Fort William, Ont., Gander, Nfld.

Head Office:
Vancouver Airport, B.C.

REPORT - OPERATION FRANKLIN

by F. W. Snell

JUNE TO SEPTEMBER, 1955

HELICOPTERS - Two Sikorsky S-55 CF-HVR
CF-HHU

OKANAGAN PERSONNEL

F. W. Snell (in charge)
D. K. Orr
K. Iverson
Gordon Hazell
G. Chamberlain - Engineer (in charge)
C. Kelly
F. Grover
R. Bryant

GOVERNMENT PERSONNEL

Dr. Y. O. Fortier - Chief of Operation Franklin
Dr. E. F. Roots - Controller of Air Movements and Deputy Chief
Nine geologists and nine assistants
One communication engineer
Two cooks

LOCATION

Arctic Islands, District of Franklin, N. W. T.; the major part of the Queen Elizabeth Islands, plus the northern part of Somerset and Prince of Wales Islands, and the northwest tip of Baffin Island.

OBJECTIVE

A broad regional reconnaissance geological survey with emphasis on the determination of major stratigraphic units and structures. Mapping of the regional distribution of these features to be made concurrently with their local study.

REQUIREMENTS OF HELICOPTERS

(1) The transportation of geologists on survey work.
(2) Of ground teams from station to station.
(3) Transportation of project personnel and equipment from base to base of operation.

RADIO EQUIPMENT

Base Radio--RCE Model TR1oo/6 Type CD24
Radio telephone 6 channels crystal controlled
100-watt output, call sign XMF21
Helicopter Radio H/F 3008 & 6552
VHF 4 channels
Intercomm.

NAVIGATION EQUIPMENT HELICOPTERS

Directional gyro, G2 compass and ADF

GAS AND FOOD CACHE PHASE

All gasoline and oil required by the helicopters away from Base 1 at Resolute Bay, plus a certain amount of camp equipment and food was airlifted prior to the commencement of the helicopter operation by Arctic Wings in a ski-wheel equipped DC 3.

LOCATIONS OF BASE CAMPS AND FUEL CACHES

Base I — Resolute Bay, Cornwallis Island - RCAF Station Fuel Cache; "O" Viks Fiord, 110 miles NE of Resolute on N. Devon Island

Base II — Oksey Bay, 110 miles NE of cache "O", S. Ellesmere Island.

Base IIa — Eureka, 200 miles N. of Base II - weather station Fuel Cache "Q" - Cornwall Island, 110 miles W. of Base II.

Base III — Ellef Rignes Island, 110 miles W. of cache "Q" Fuel Cache "P" - Axel Heiberg Island, 110 miles NE of Base III
Fuel Cache "S" - Lougheed Island, 90 miles SW of Base III

Base IV — Melville Island, 95 miles SSW of cache "S"
Fuel Cache "T" - Bathurst Island, 110 miles E of Base III and 110 miles NW of Resolute Bay.

THE OPERATION

The two helicopters were to be partially dismantled for shipment by RCAF C119 from Malton Airport to Resolute Bay, NWT.

June 7 - CF-HHU was loaded aboard C119 with F. Snell, R. Bryant, C. Kelly and F. Grover, taking off at 1040 for Churchill. On arrival at Churchill, landed at Coral Harbour and arrived at Resolute Bay 1910 on June 8th. Unloading from C119 took approximately 2 hours, all the necessary equipment and personnel being readily available.

June 9 - Assembly of CF-HVR. Snell took a flight with Arctic Wings DC 3 to Base IV on final fuel caching, and to take a general recco over type of country helicopter would be working. At 1530, second C119 arrived with helicopter CF-HVR and K. Iverson, D. K. Orr, G. Chamberlain, S. Hubenig.

June 10 - Assembling both helicopters and test flew HVR. This machine was assembled quicker than HHU by reason of its being the last to be dismantled and it was found unnecessary to dismantle certain items.

June 11 - HHU test flown and radios checked in both machines. C119 arrived with spare engine, blade, etc.
Weather: intermittent snow, visibility 1/2 mile, temp 0° C.

June 12 - Both machines ready to start operations but geological crews not quite ready.

June 13 - The operation finally starts with one flight to Somerset Island and one to Devon Island.
The area to be surveyed from Base I at Resolute:
Somerset Island, Prince Patrick Island, Devon Island, and Baffin Island.

The field parties consisted of one geologist and one assistant plus food and equipment for fourteen days. The weight of the complete party averaged approximately 700 lbs. The length of stay in one location averaged four to five days. On every flight one of the geologists would act as navigator up front with the pilot; usually the job of navigator was carried out by Dr. Fortier and Dr. Roots. Aeronautical charts (8 miles to the inch) and air photographs were used for navigation purposes and the geologist navigating mapped geological features on every flight.

Very accurate pre-flight planning was done by the navigator; gas loads, distances, etc., were accurately recorded on Flight Plan Forms, appendix "A" attached.

No deviation from the flight plan was made during flight without notifying Base operations.

Fuel consumption for both machines worked out to approximately 3.6 lbs. per minute and an overall cruising speed of 70 m.p.h. One hour reserve of fuel was always considered in the flight planning and five minutes flying time was found to be adequate for intermediate stops for geological work. A gross weight of 7200 lbs. was used in both machines.

Met. forecasts were obtained from Resolute valid for 24 hour periods and these on the whole were found to be quite accurate, but local conditions often prevailed en route, which of course could not be forecast.

The base radio was set up at Resolute and a continuous watch was maintained on 3008 whenever the helicopters were flying or away from base and weather conditions could be obtained from base on request. George Chamberlain modified the H/F antenna on both machines to give greater range, and under normal reception conditions it was possible to transmit and receive on voice up to 200 miles. CW keys were installed in both machines and using CW the range was found to be 300 miles or better which meant that we were in radio contact with base anywhere on the operation. Tommy Ling, the communications officer, was exceptionally capable and of great importance to the success of the operation.

ADF was not used to any extent during the operation; on good flying days it worked well but on poor days when there was precipitation and ADF needed, it didn't work very well, and consequently we did not rely on it too much.

A G2 compass was fitted to helicopter HHU but was not used except as a directional gyro.

The Directional gyros were used all the time and were the main navigational instrument. The method of setting the gyro at Resolute was to line up with the True bearing of the runway and the method of resetting was for the navigator to take a True bearing on two prominent landmarks and line the aircraft up and reset. Operating from subsequent bases, two prominent landmarks were found close to the base and the gyro set after takeoff.

The geologists acting as navigators were extremely good map readers and very proficient at reading air photographs.

The maps used, Aeronautical Series 8 miles to the inch, were found to be reasonably accurate for the coast lines, major rivers and gypsum domes, but secondary rivers and contours were in many cases quite inaccurate and could not be relied on.

Navigation over pack ice had to be by directional gyro and dead reckoning and estimating drift. Ice leads and icebergs were plotted on maps by the navigator and proved valuable in subsequent flights when flying conditions had deteriorated. Blown snow on the ice pack follows a definite pattern and can be used as a guide or a rough gyro setting.

Low-lying land masses with unbroken snow conditions present the same problems as pack ice and again true courses with the DG and dead reckoning are the only methods than can be used. Certain areas are very featureless except for the coastlines. With this unbroken snow condition and a low overcast or any precipitation, there is always the danger of "white-outs" where the over cast blends completely with the snow on the ground, and of finding yourself either on instruments or into the ground.

On CAVU days, which were few and far between during the summer of 1955, mirages were quite frequent and a coast line across pack-ice 30 miles or 40 miles away 200' high will appear as a 2000' cliff and only 15 - 20 miles away; it's not dangerous, but is something to remember.

Weather conditions during this operation from Base I were fair, quite a lot of fog, low stratus, and occasional snow. High winds curtailed flying for only one day.

During the period June 13 - July 17th at Base I, and including the move to Base II, out of 35 days, 20-1/2 were unfit for flying, but of course with 24 hours of daylight every advantage was taken of the good weather. Many days a low ceiling of 1 - 300' of stratus covered the whole area but visibility was exceptionally good. Low stratus in the distance can be mistaken for coast-line or open water.

Flying was usually carried out at 1 - 1500' over pack-ice, or when geologists were not carrying out mapping and when weather conditions permitted this altitude. Where geology was to be mapped from the air, lower altitudes were flown permitting the geologist to study the terrain and often the helicopters were flown alongside certain cliff formations giving the observer heights and depth of rock structures.

Landing spots for the helicopters in the area from Base I did not present any problems; almost all the beaches were found to be reasonably solid and level, and the sea-ice was suitable. The river beds with large gravel were good, the muddier type were found to be too soft.

The interior of the islands during the period from June 15th to July 15th when the snow is melting can be quite soft and unsuitable; but lighter looking knolls or rock outcrops where the drainage is good are suitable. The snow itself is usually solid enough for landings.

Emergency equipment carried by the helicopters consisted of two sleeping bags and one tent per person on board, ten days' food, gasoline for cooking purposes, shotgun with No. 4 shells and ball ammunition, full blade and hub covers. Crews can expect to have to sit out weather for 3 or 4 days, sleeping and cooking in the helicopter. The S-55 sleeps four persons comfortably and a fifth can be accommodated in the baggage compartment without too much discomfort. George Chamberlain spent three nights there and suffered no ill effects.

The move from Base I to Base II was completed July 17th and had been curtailed owing to poor weather conditions, mainly fog and fracto stratus with occasional snow and drizzle.

VII days, which were few and far between during the summer of 1953, ...re quite frequent and a coast like across pack ice 30 miles or ...y 200' high will appear as a 2000' cliff and only 15 - 20 miles ... dangerous, but is something to remember.

conditions during this operation from base I were fair, quite a lot ...w stratus, and occasional snow. High winds curtailed flying for ... days.

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... depths in the area from Base I did not present any ... weather were found to be reasonably solid and ... The river beds with large gravel were ...

... the period from June 15th to July 15th ... and unsuitable, but further ... there the drainage is good and flat, ... Resolution, or Beechey.

... consisted of two sleeping ... food, quarters for each ...

Between Devon Island and Ellesmere Island on the flight between Base I and II, we had two open stretches of water to contend with, Cardigan Straits and Hells Gate, approximately 8 miles across each channel, and approximately 50 miles long; thus open water produced fog which hampered the base-to-base move. When weather conditions were suitable flights across the open water were made at 6000'; if the cloud base was low, a detour of approximately 25 miles was made to the N. W. over the pack-ice. The last flight from Resolute to Base II, July 15th, was made just as the ice was moving out of Wellington Channel between Cornwallis Island and Devon Island; if the move had not been completed by that date, it would have meant an over-water crossing of at least 20 miles.

June 30 - Ron Bryant sick at Resolute with quinsy and confined to sick quarters and the medical officer decided it would be better for him to return to Toronto rather than spend the summer under canvas, which might aggravate the ailment. He left July 6th by C119.

June 30 - The engine in HVR giving trouble with continual plug fouling. George Chamberlain suspected impeller seal gone, so decided to change the engine at Resolute. Engine change completed July 1st in record time.

July 4 - At Resolute Ken Iverson was taken sick at 2300 hours suffering from very acute back and groin pains. Dr. Fortier diagnosed the trouble as kidney disorder. The medical officer at Resolute was called in and he administered 2 grains of morphine and decided to try and evacuate him to military hospital at Churchill. The S/Ldr. in charge of the Lancaster detachment at Resolute was approached and he agreed to have a Lancaster take Iverson to Churchill immediately. The machine took off at 0300 July 5th. The medical officer travelled with him and administered 2 more grains of morphine.

On all base moves, 1000 lbs. of freight was carried with 2 hours and 45 minutes of gas plus the emergency equipment. It was found that with the amount of gas carried it was impossible to detour weather to any great extent, or to reduce airspeed too much in conditions of poor visibility, otherwise we would not have enough fuel to reach our destinations.

By July 17th the move to Base II was completed and all work finished on Somerset Island, Prince Patrick Island, N. Baffin Island and Devon Island. Base II was now completely occupied and the area to be surveyed was Ellesmere Island, S. W. Axel Heiberg and Graham Island. The weather, when operating from Base II, was the same old thing, lots of fog, low stratus and fracto stratus with the occasional snow and drizzle; the order seemed to be one good day and three bad.

July 18 - Both machines left Base Ii for Eureka on Ellesmere Island for a temporary detachment at Base IIa. G. Chamberlain was taken along for maintenance during the detachment.

The weather conditions over Northern Ellesmere and Axel Heiberg were in the main much better than the other islands on which we operated; this was possibly due to the different type of terrain. This country is much more mountainous, with peaks up to 8000' and numerous snow fields and glaciers.

Landing spots were not quite so numerous as on the previous island, the cliffs often came right up to the shore line, leaving very few beaches suitable for landings. The mountains themselves were very precipitous and of hard rock which had not eroded to give level areas the same as sandstone or limestone mountains. However, there were no occasions when the geologists wanted to land that a landing area could not be found adjacent.

Landings were made on the glaciers and snowfields and no difficulty was experienced; the highest landings were in the neighbourhood of 6000'. Turbulence was experienced on only one half day. The west coasts of Ellesmere and Axel Heiberg had numerous plateaus at about 1 - 2000', quite level and large enough in size to land a fixed-wing aircraft excepting that the soil was of considerable depth and was too soft, but by picking the drier areas the helicopters had no difficulty. Some of the river beds were very similar to those in British Columbia, with quite large boulders, and spots had to be picked carefully.

During the stay at the weather station at Eureka, the American and Canadian personnel were very hospitable, and the very good food and accommodation was appreciated by all.

The ice in the area at this time of the year was still solid, but was beginning to break up around the shore-line and at the mouths of the larger rivers.

Helicopter HVR, Snell, returned to Base II on July 23rd. HHU, Orr, remaining at Eureka to move field parties in the area.

T. Ling, the communication engineer, was able to obtain three weather forecasts daily from Resolute Bay, also weather conditions from Isachson and Eureka four times daily. This gave us very good coverage for the area in which the helicopters were operating. Base II itself seemed a poor location for weather. It was a small bay on the west coast of S. Ellesmere and produced a lot of fog which took a long time to burn off or lift sufficiently for the machines to operate.

Most of the work scheduled for Base II was completed and the base move to III was started, and at this time (July 24th) the weather deteriorated - the same type of weather we had been experiencing but more of it. The route to Base III was via Cache "Q" on Cornwall Island and was mainly over sea ice; during the period July 24th to August 4th, only one flight was successful in reaching Base III. August 4th HHU returned to Base II from Eureka and Dr. Fortier decided in view of the poor weather and possible break-up of ice between base and the shortage of food at Base II, to establish a camp at Cache "Q" approximately half way to Base III.

Fortunately, we had two good days of weather and everything was moved out of Base II, and Base III was occupied. However, the base radio was left at Cache "Q" with the operator, one cook and one geologist assistant.

As we had a number of crews still out on Axel Heiberg and Amund Rignes Island, which would necessitate flights around Cache "Q", it was decided to leave the radio and operator there to advise on weather conditions in that area, and this did prove an advantage.

The areas to be surveyed from Base III were: Amund Rignes and Ellef Rignes Islands, Cornwall Island and S.W. Axel Heiberg Island. The weather had been gradually deteriorating with more fog and much colder with more frequent snow flurries and freezing drizzle.

Amund and Ellef Rignes are two very flat and featureless islands, with approximately 60% of the islands consisting of water courses, and after the break-up is just mud down to the perma frost. This was the one area Dr. Fortier was dubious about the helicopter's ability to land in, and a type of board had been discussed to put under the wheels to prevent sinking. However, apart from the mud beaches and water courses no difficulty was experienced in finding suitable solid landing areas.

August 7th - August 16th very few trips completed, HHU holding for three days on Axel Heiberg because of weather. HVR could not return to Base III from Axel Heiberg for four days. The area around Base III, Amund and Ellef Rignes Islands was a weather producer. Because of the amount of moisture on the land mass and the very flat terrain, fog and very low stratus was very prevalent, and would persist for two or three days and sometimes even longer.

August 16 - HVR proceeded to Resolute Bay to pick up the third pilot, Gordon Jazell, who had been waiting for three weeks to join the operation. One geological party was taken to Bathurst Island enroute and George Chamberlain accompanied the machine to change the freewheel bearing at Resolute. The weather at Resolute was poor for the next six days with winds up to 50 knots and about four inches of snow. No flying was carried out, and apparently it was the same at Base III.

August 22 - HVR returned to Base III and HHU brought the radio and operator and remaining crews from Cornwall to Base III. In view of the prevailing poor weather conditions and the survey program getting behind schedule, Dr. Fortier decided to abandon the occupation of Base IV and fly excess equipment and the geologists assistant to Isachson weather station, where they could be airlifted out to Resolute during the fall airlift.

This was approximately 20th September. This would relieve the helicopters of numerous freighting trips to Resolute Bay. The geologists would then form four field parties and would be taken to locations towards Resolute Bay. This would again enable the survey to continue operation but would bring the whole operation closer to Resolute in case of ice break-up or winter setting in, making flying hazardous.

At this time, August 26th, there were still four crews on Axel Heiberg and the priority flying was to bring them back to Base III and consolidate the operation.

By September 2nd, everything not required had been flown into Isachson, the crews in Axel Heiberg had been brought back and staged between Base III and Resolute and two trips made to Base IV to bring back food and naphtha gas. Although it might appear the operation was closing down, in actual fact all that had happened was that it had been reduced in size. Geological work of equal importance was being carried on just as effectively by the eight geologists making the four teams.

By September 3rd, temperatures were dropping, the ground was frozen and snow covered the majority of the land. One pilot and one engineer plus two loads of equipment were taken to Resolute Bay, both machines returning to Base III to clean up the camp of any equipment and bring the two remaining helicopter engineers to Resolute.

The areas in which the survey was being carried out at this time were Lougheed Island, Cameron Island, and Bathurst Island. These islands in the main were quite flat, the highest land being on Bathurst at approximately 2000'. This area was ideal for helicopter operations, as landings could be made practically anywhere.

Navigation presented the same problems as at the start of the operation in June. The terrain was featureless, and with the snow covering and a low overcast, map reading was difficult. The use of the directional gyro and dead reckoning was found to be the only method over large land areas.

Ice conditions had deteriorated in this area by September 7th and many of the channels and bays around Bathurst Island were completely free of ice, so detours had to be made to avoid the open water. On the route back from Cache "T" on Bathurst Island to Resolute Bay on Cornwallis Island, we found that two narrow channels separate Bathurst from Cornwallis Island.

These two channels are each about four miles across and were free of ice for the most part of the year. The open water produced fog and a number of flights were delayed owing to this fog condition; even when the fog dispersed, a low layer of stratus persisted which means making this water crossing at an altitude of 500' or less. Dinghies and Mae Wests were carried on all these flights. It's not very far across but the water looked awfully cold.

September 14th - The last crews were brought into Resolute Bay from Bathurst Island, the weather was far from good, ice fog persisting in some areas for days on end.

September 15th - One machine made a circuit of Cornwallis Island cleaning up certain geology which had been done in previous years by dog teams. The other machine carried on local flying at Resolute Bay, taking a few people for short flights. Dr. Fortier released the machines and a start was made to dismantle HHU.

September 17th - Dr. Fortier made arrangements with the RCAF to transport most of the personnel out of Resolute Bay to Ottawa by RCAF North Star; the C119's would not be available to airlift the S-55's until September 27th so it was decided to release the three helicopter pilots and one engineer and they could travel by North Star. Snell went by RCAF to Winnipeg and TCA to Vancouver, arriving September 18th. Orr, Hazell and Grover travelled to Ottawa and thence to Toronto. G. Chamberlain and C. Kelly remained at Resolute to load the S-55's aboard the C119.

SUMMARY

1. Dr. Fortier and the personnel of Operation Franklin were extremely cooperative and pleasant to work with and their planning of the operation was exceptionally good.

2. The type of terrain is ideally suitable for helicopter operations.

3. Temperatures and winds created no problems.

4. Maintenance was no problem in the field; excellent work was done by the maintenance staff, and it was a comforting thought to the pilots to know that the helicopters were in first-class shape whenever they were required to fly.

5. Navigation by the geologists was first-class; a directional gyro with less precision would be an advantage, also an artificial horizon.

6. Emergency flotation gear is really essential for the small bodies of open water encountered at the end of the season.

7. The whole of the operation could have been completed if the weather had been more favourable. By all accounts it was one of the worst summers on record for that region of the Arctic.

8. The personnel at Resolute, Eureka and Isachson were most cooperative and hospitable whenever the helicopters were at their stations.

9. The weather forecasts on the whole were very good, but local conditions created by open water and types of terrain could not be forecast and hampered the longer flights.

Total hours flown on operation:	CF-HHU	292:45 hours
	CF-HVR	263:40 hours

WILD LIFE SEEN ON THE OPERATION

A count of approximately 600 musk oxen was made by the geologists. These were seen mainly on Grinnell Peninsula, Ellesmere, Axel Heiberg, Graham, Bathurst, and Cornwallis Island. Caribou were seen on the same islands as the musk oxen. Arctic wolves, foxes, hare, polar bear, walrus and seal were seen in most areas. Bird life was not too plentiful; in the southern areas there were snow buntings, Arctic tern. On Ellesmere and Axel Heiberg there were quite large numbers of snow geese and a few Brant geese and around Bathurst and Ellef Rignes a fair number of ptarmigan. A few bumble bees were seen on Axel Heiberg, and on Ellesmere. Vegetation was very sparse, pussy willow about an inch high, and Arctic poppies and a type of coarse grass or lichen was about the sum total.

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BACK COVER: Actual unretouched color photograph of a Bell 47 helicopter carrying freight into a canyon location at Penticton, B.C.

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